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Engdahl et al.

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(54) **METHOD AND APPARATUS FOR DETERMINING A SELECTION OPTION**

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G06F 3/041 (2006.01)

(52) **U.S. Cl.**
CPC ***G06F 3/0416*** (2013.01); ***G06F 3/0488*** (2013.01)

(58) **Field of Classification Search**
CPC G06F 3/01; G06F 3/033; G06F 3/048; G06F 3/0481; G06F 3/04812; G06F 3/04817; G06F 3/04842; G06F 3/0482; G06F 3/0488
See application file for complete search history.

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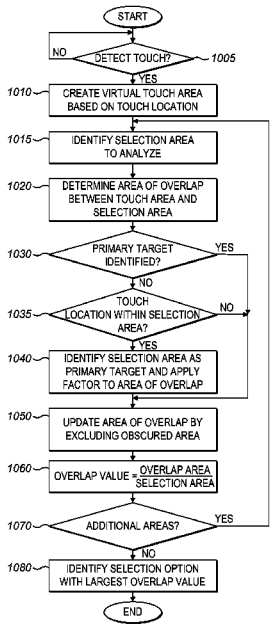
(57) **ABSTRACT**

A method includes, displaying a plurality of selection options on a touch-sensitive display, detecting a touch at a touch location on the touch-sensitive display, determining a touch area based on the touch location, determining an overlap value based on a size of the touch area that overlaps a selection area associated with a selection option, and on a size of the selection area, and identifying a selection option based on the determined overlap value.

18 Claims, 7 Drawing Sheets



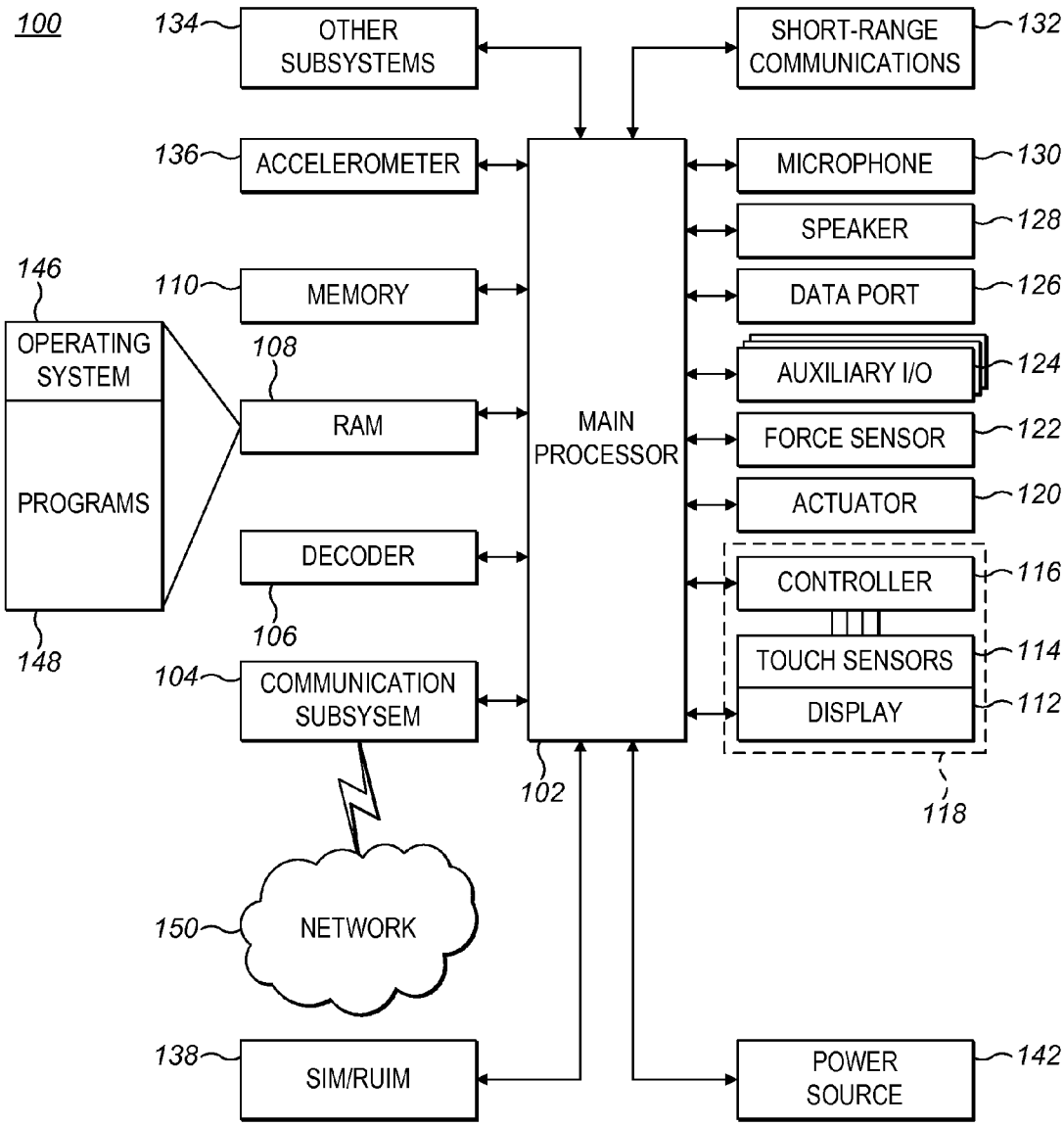

100
134
OTHER SUBSYSTEMS
SHORT-RANGE COMMUNICATIONS
132
136
ACCELEROMETER
MICROPHONE
130
SPEAKER
128
146
110
MEMORY
DATA PORT
126
OPERATING SYSTEM
108
AUXILIARY I/O
124
RAM
MAIN PROCESSOR
FORCE SENSOR
122
PROGRAMS
ACTUATOR
120
DECODER
CONTROLLER
116
106
TOUCH SENSORS
114
148
104
COMMUNICATION SUBSYSEM
DISPLAY
112
102
118
NETWORK
150
138
SIM/RUIM
POWER SOURCE
142

FIG. 1

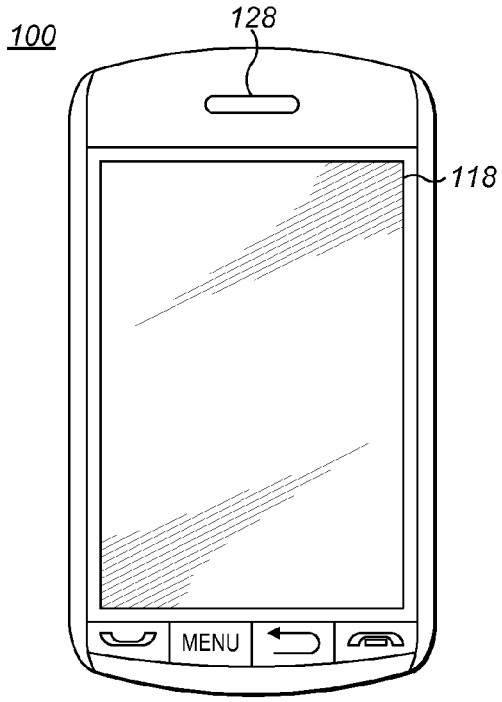


FIG. 2

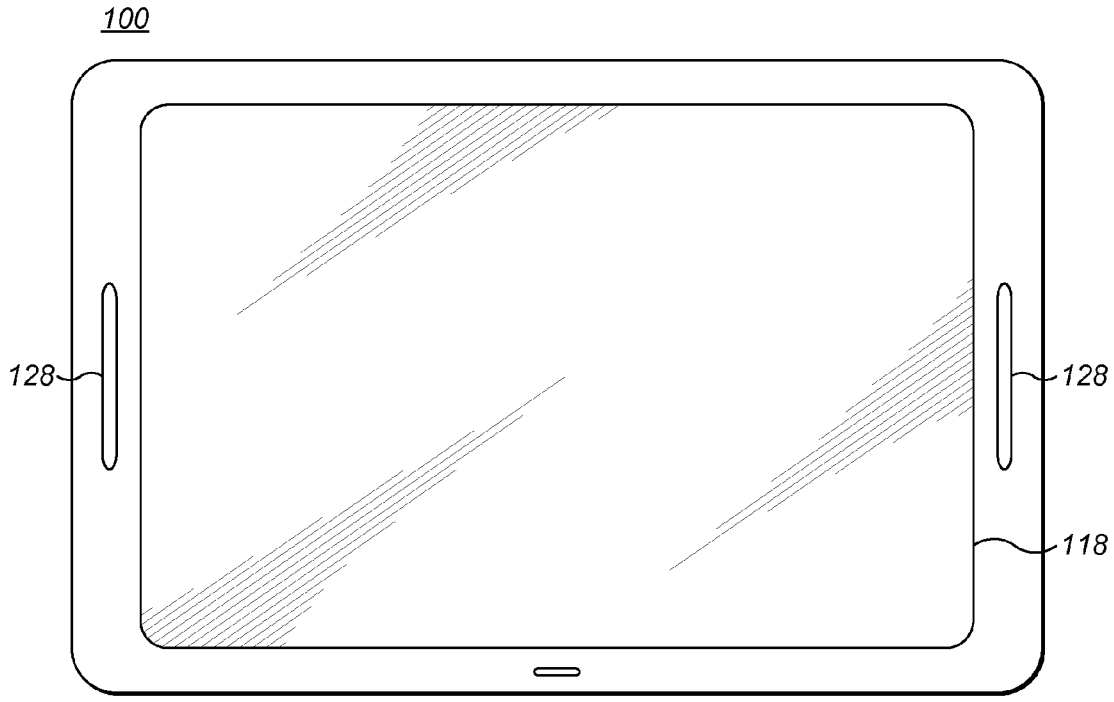


FIG. 3

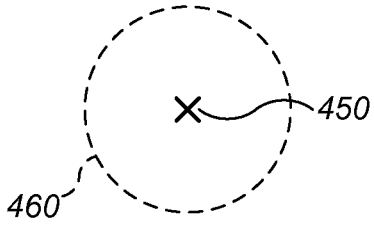

450
460

FIG. 4

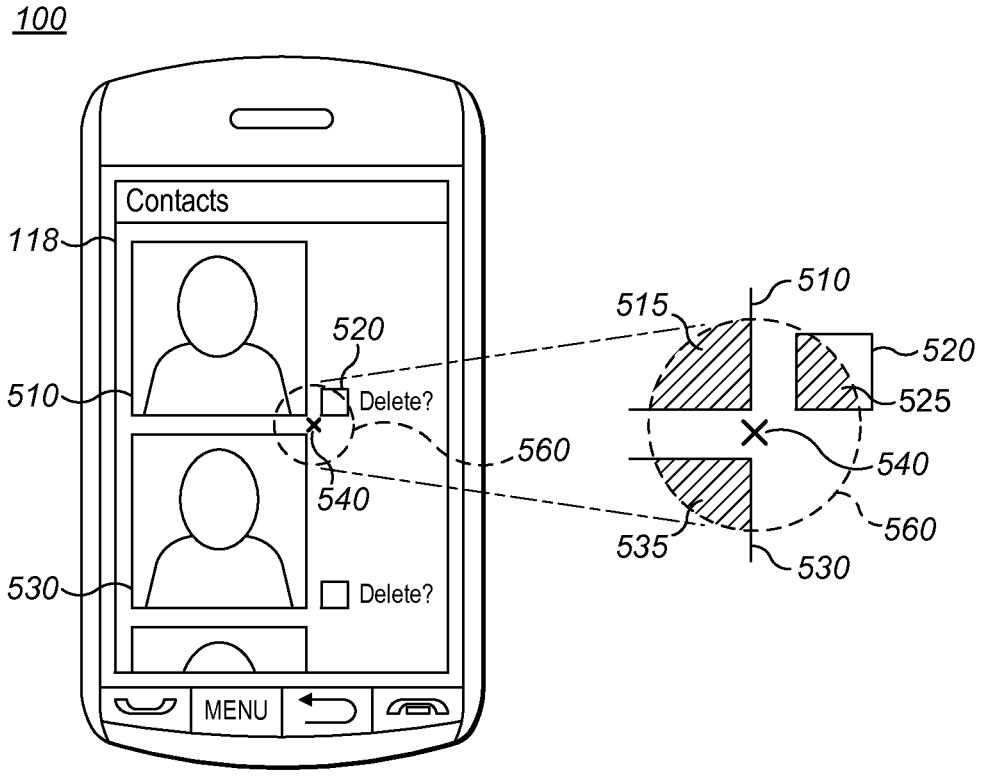

100
Contacts
118
510
520
Delete?
560
540
530
Delete?
MENU
515
510
520
525
540
560
535
530

FIG. 5

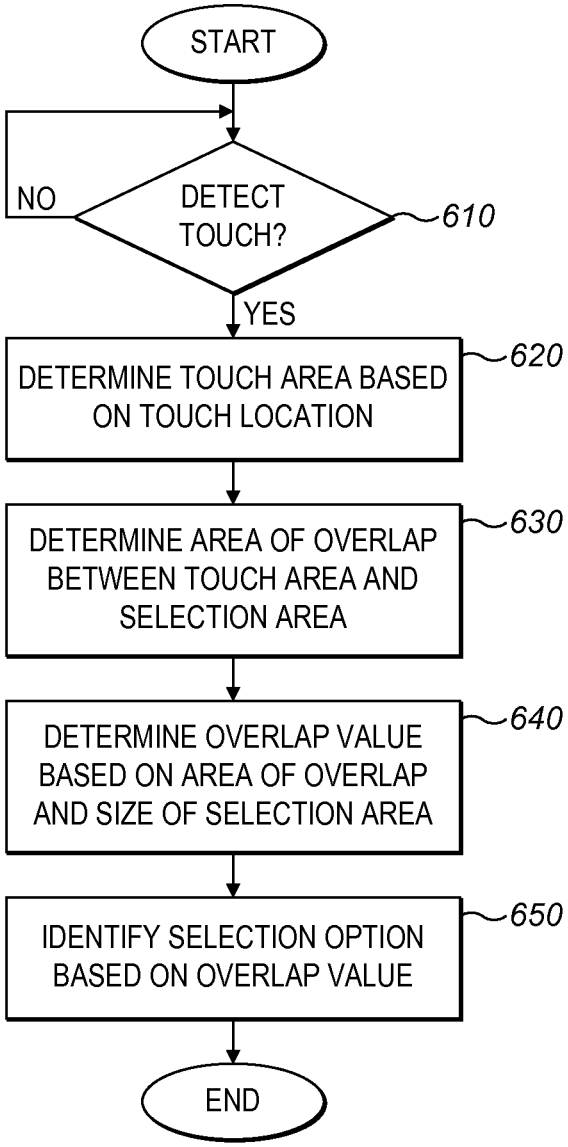

START
DETECT TOUCH?
NO
610
YES
DETERMINE TOUCH AREA BASED ON TOUCH LOCATION
620
DETERMINE AREA OF OVERLAP BETWEEN TOUCH AREA AND SELECTION AREA
630
DETERMINE OVERLAP VALUE BASED ON AREA OF OVERLAP AND SIZE OF SELECTION AREA
640
IDENTIFY SELECTION OPTION BASED ON OVERLAP VALUE
650
END

FIG. 6

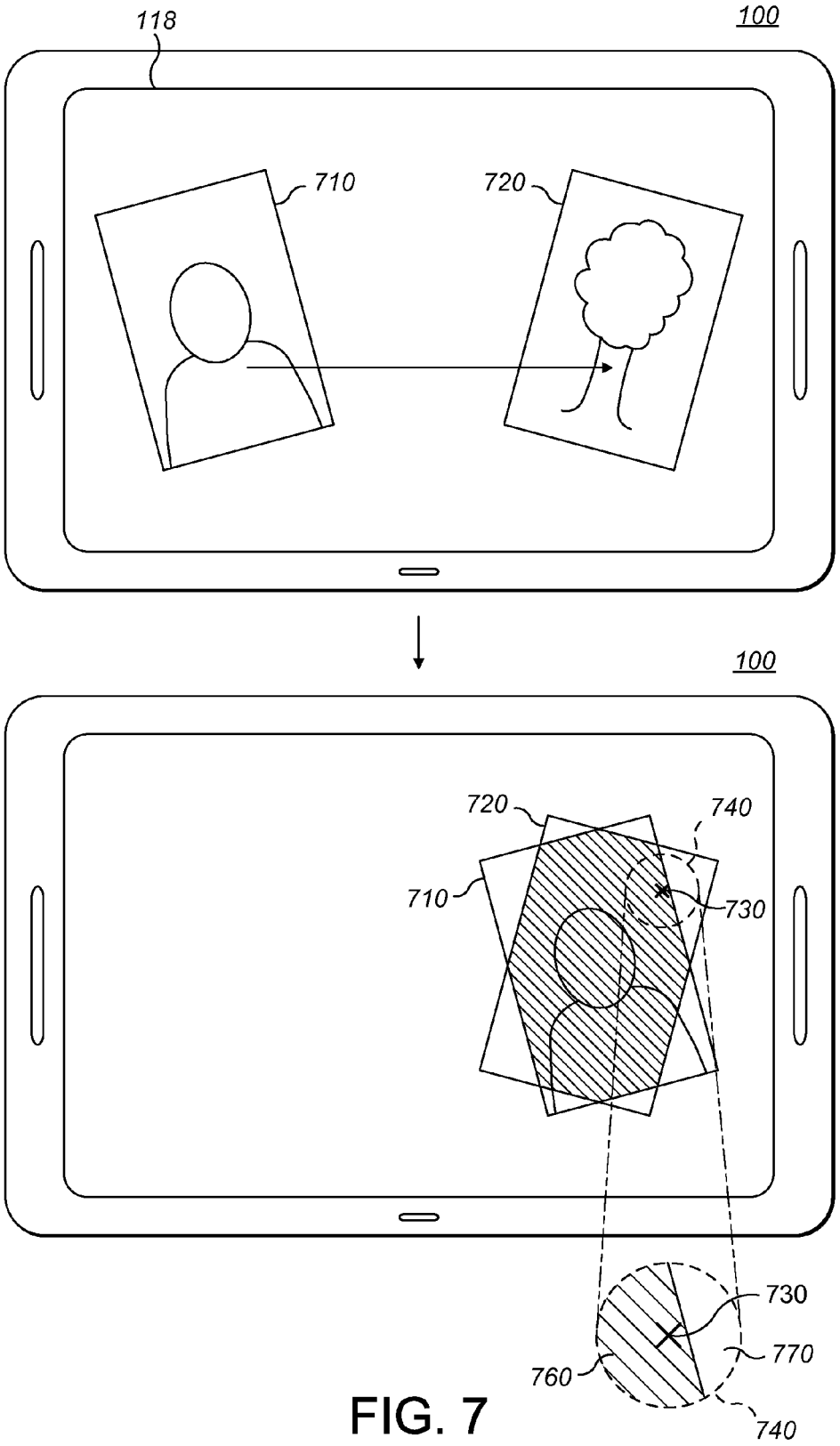


FIG. 7

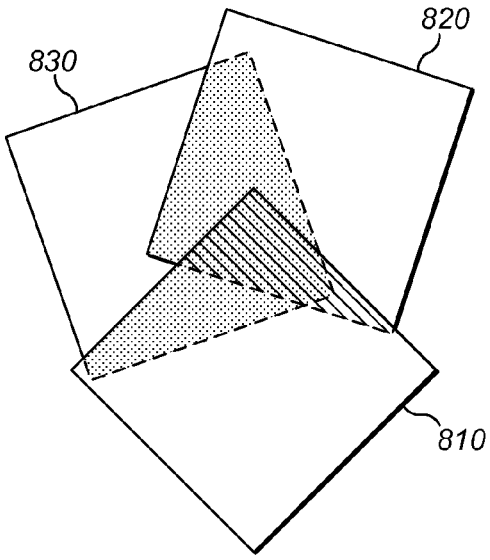


FIG. 8

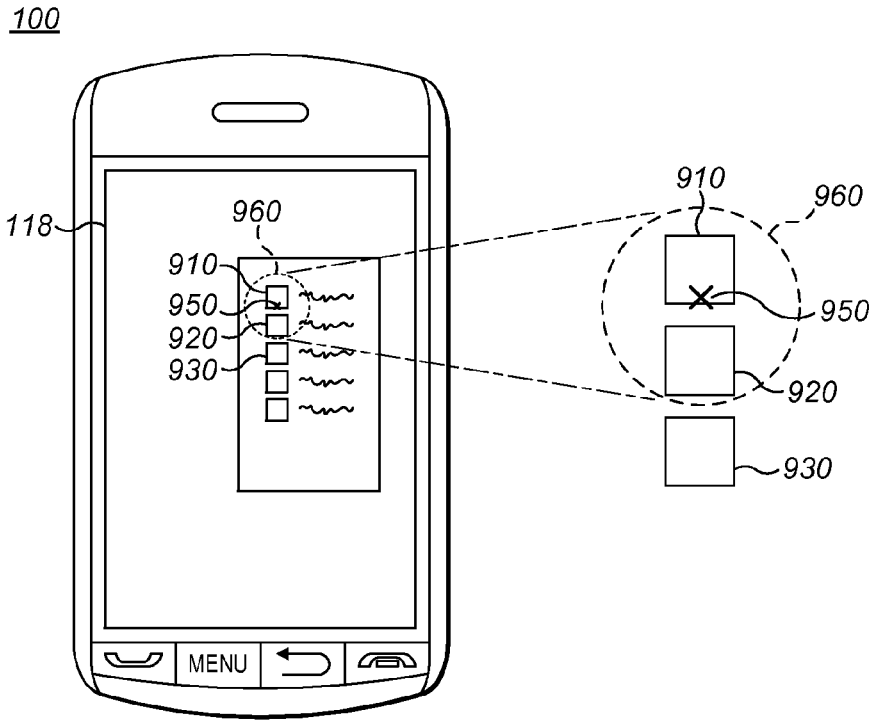


FIG. 9

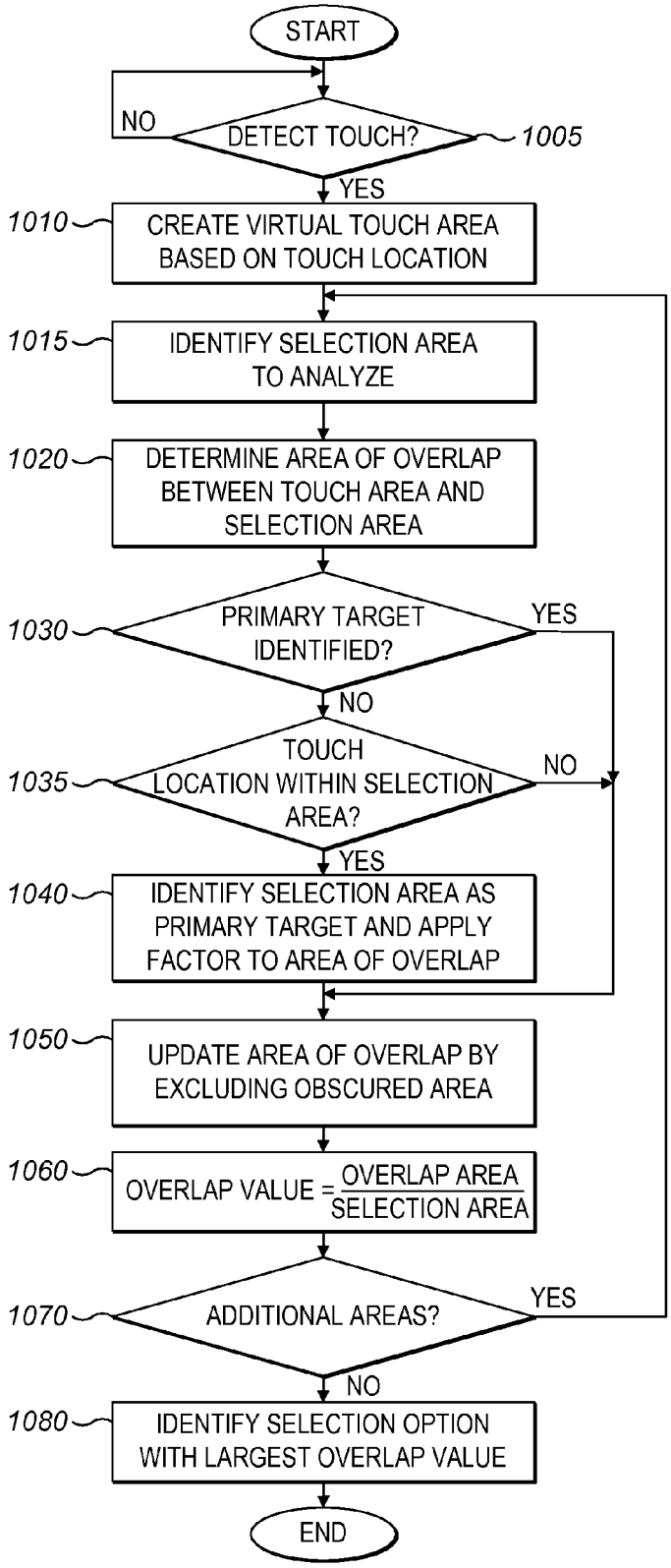

START
NO
DETECT TOUCH?
1005
YES
1010
CREATE VIRTUAL TOUCH AREA BASED ON TOUCH LOCATION
1015
IDENTIFY SELECTION AREA TO ANALYZE
1020
DETERMINE AREA OF OVERLAP BETWEEN TOUCH AREA AND SELECTION AREA
1030
PRIMARY TARGET IDENTIFIED?
YES
NO
1035
TOUCH LOCATION WITHIN SELECTION AREA?
NO
YES
1040
IDENTIFY SELECTION AREA AS PRIMARY TARGET AND APPLY FACTOR TO AREA OF OVERLAP
1050
UPDATE AREA OF OVERLAP BY EXCLUDING OBSCURED AREA
1060
OVERLAP VALUE = OVERLAP AREA / SELECTION AREA
1070
ADDITIONAL AREAS?
YES
NO
1080
IDENTIFY SELECTION OPTION WITH LARGEST OVERLAP VALUE
END

FIG. 10

METHOD AND APPARATUS FOR DETERMINING A SELECTION OPTION

FIELD OF THE TECHNOLOGY

The present disclosure relates to electronic devices, including but not limited to, portable electronic devices having touch-sensitive displays and their control.

BACKGROUND

Electronic devices, including portable electronic devices, have gained widespread use and may provide a variety of functions including, for example, telephonic, electronic messaging and other personal information manager (PIM) application functions. Portable electronic devices include, for example, several types of mobile stations such as simple cellular telephones, smart phones, wireless personal digital assistants (PDAs), and laptop computers with wireless 802.11 or Bluetooth capabilities.

Portable electronic devices such as PDAs or smart telephones are generally intended for handheld use and ease of portability. Smaller devices are generally desirable for portability. A touch-sensitive display, also known as a touchscreen display, is particularly useful on handheld devices, which are small and have limited space for user input and output. The information displayed on the touch-sensitive displays may be modified based on the functions and operations being performed. With continued demand for decreased size of portable electronic devices, touch-sensitive displays continue to decrease in size.

Improvements in devices with touch-sensitive displays are desirable.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a block diagram of a portable electronic device in accordance with the disclosure.

FIG. **2** is a front view of an example of a smartphone in accordance with the disclosure.

FIG. **3** is a front view of an example of a tablet computer in accordance with the disclosure.

FIG. **4** illustrates an example of a touch area in accordance with the disclosure.

FIG. **5** illustrates an example of overlap values for selection from selection options of different sizes on an electronic device in accordance with the disclosure.

FIG. **6** is a flowchart illustrating a method of selecting a selection option based on overlap values in accordance with the disclosure.

FIG. **7** illustrates an example showing an obscured selection option on an electronic device in accordance with the disclosure.

FIG. **8** shows obscured selection options and visible areas in accordance with the disclosure.

FIG. **9** illustrates an electronic device showing weighting when selecting from multiple selection options in accordance with the disclosure.

FIG. **10** is a flowchart illustrating a method of selecting a selection option based on overlap values, overlapping selection options, and weighting in accordance with the disclosure.

DETAILED DESCRIPTION

The following describes an apparatus for and method of determining a selection of a selection option based on received input.

For simplicity and clarity of illustration, reference numerals may be repeated among the figures to indicate corresponding or analogous elements. Numerous details are set forth to provide an understanding of the examples described herein. The examples may be practiced without these details. In other instances, well-known methods, procedures, and components are not described in detail to avoid obscuring the examples described. The description is not to be considered as limited to the scope of the examples described herein.

The disclosure generally relates to an electronic device, such as a portable electronic device or non-portable electronic device. Examples of portable electronic devices include mobile, or handheld, wireless communication devices such as pagers, cellular phones, cellular smart-phones, wireless organizers, personal digital assistants, wirelessly enabled notebook computers, tablet computers, mobile internet devices, electronic navigation devices, and so forth. The portable electronic device may be a portable electronic device without wireless communication capabilities, such as handheld electronic games, digital photograph albums, digital cameras, media players, e-book readers, and so forth. Examples of non portable electronic devices include desktop computers, electronic white boards, smart boards utilized for collaboration, built-in monitors or displays in furniture or appliances, and so forth.

A block diagram of an example of an electronic device **100** is shown in FIG. **1**. The electronic device **100** includes multiple components, such as a processor **102** that controls the overall operation of the electronic device **100**. Communication functions, including data and voice communications, are performed through a communication subsystem **104**. Data received by the electronic device **100** is decompressed and decrypted by a decoder **106**. The communication subsystem **104** receives messages from and sends messages to a wireless network **150**. The wireless network **150** may be any type of wireless network, including, but not limited to, data wireless networks, voice wireless networks, and networks that support both voice and data communications. A power source **142**, such as one or more rechargeable batteries or a port to an external power supply, powers the electronic device **100**.

The processor **102** interacts with other components, such as a Random Access Memory (RAM) **108**, memory **110**, a touch-sensitive display **118**, one or more actuators **120**, one or more force sensors **122**, an auxiliary input/output (I/O) subsystem **124**, a data port **126**, a speaker **128**, a microphone **130**, short-range communications **132** and other device subsystems **134**. The touch-sensitive display **118** includes a display **112** and touch sensors **114** that are coupled to at least one controller **116** that is utilized to interact with the processor **102**. Input via a graphical user interface is provided via the touch-sensitive display **118**. Information, such as text, characters, symbols, images, icons, and other items that may be displayed or rendered on a electronic device, is displayed on the touch-sensitive display **118** via the processor **102**. The processor **102** may also interact with an accelerometer **136** that may be utilized to detect direction of gravitational forces or gravity-induced reaction forces.

To identify a subscriber for network access, the electronic device **100** may utilize a Subscriber Identity Module or a Removable User Identity Module (SIM/RUIM) card **138** for communication with a network, such as the wireless network **150**. Alternatively, user identification information may be programmed into memory **110**.

The electronic device **100** includes an operating system **146** and software programs, applications, or components **148** that are executed by the processor **102** and are typically stored in a persistent, updatable store such as the memory **110**.

Additional applications or programs may be loaded onto the electronic device **100** through the wireless network **150**, the auxiliary I/O subsystem **124**, the data port **126**, the short-range communications subsystem **132**, or any other suitable subsystem **134**.

A received signal such as a text message, an e-mail message, or web page download is processed by the communication subsystem **104** and input to the processor **102**. The processor **102** processes the received signal for output to the display **112** and/or to the auxiliary I/O subsystem **124**. A subscriber may generate data items, for example e-mail messages, which may be transmitted over the wireless network **150** through the communication subsystem **104**. For voice communications, the overall operation of the electronic device **100** is similar. The speaker **128** outputs audible information converted from electrical signals, and the microphone **130** converts audible information into electrical signals for processing.

The touch-sensitive display **118** may be any suitable touch-sensitive display, such as a capacitive, resistive, infrared, surface acoustic wave (SAW) touch-sensitive display, strain gauge, optical imaging, dispersive signal technology, acoustic pulse recognition, and so forth. A capacitive touch-sensitive display includes one or more capacitive touch sensors **114**. The capacitive touch sensors may comprise any suitable material, such as indium tin oxide (ITO).

One or more touches, also known as touch contacts or touch events, may be detected by the touch-sensitive display **118**. The processor **102** may determine attributes of the touch, including a location of the touch. Touch location data may include data for an area of contact or data for a single point of contact, such as a point at or near a center of the area of contact. The location of a detected touch may include x and y components, e.g., horizontal and vertical components, respectively, with respect to one's view of the touch-sensitive display **118**. For example, the x location component may be determined by a signal generated from one touch sensor, and the y location component may be determined by a signal generated from another touch sensor. A touch may be detected from any suitable input member, such as a finger, thumb, appendage, or other objects, for example, a stylus (active or passive), pen, or other pointer, based on the nature of the touch-sensitive display **118**. Multiple simultaneous touches may be detected.

One or more gestures may also be detected by the touch-sensitive display **118**. A gesture, such as a swipe, also known as a flick, is a particular type of touch on a touch-sensitive display **118** and may begin at an origin point and continue to an end point, for example, a concluding end of the gesture. A gesture may be identified by attributes of the gesture, including the origin point, the end point, the distance travelled, the duration, the velocity, and the direction, for example. A gesture may be long or short in distance and/or duration. Two points of the gesture may be utilized to determine a direction of the gesture. A gesture may also include a hover. A hover may be a touch at a location that is generally unchanged over a period of time or is associated with the same selection item for a period of time.

The optional actuator(s) **120** may be depressed or activated by applying sufficient force to the touch-sensitive display **118** to overcome the actuation force of the actuator **120**. The actuator(s) **120** may be actuated by pressing anywhere on the touch-sensitive display **118**. The actuator(s) **120** may provide input to the processor **102** when actuated. Actuation of the actuator(s) **120** may result in provision of tactile feedback.

Optional force sensors **122** may be disposed in conjunction with the touch-sensitive display **118** to determine or react to forces applied to the touch-sensitive display **118**. The force sensor **122** may be disposed in line with a piezo actuator **120**. The force sensors **122** may be force-sensitive resistors, strain gauges, piezoelectric or piezoresistive devices, pressure sensors, quantum tunneling composites, force-sensitive switches, or other suitable devices.

The touch-sensitive display **118** includes a display area in which information may be displayed, and a non-display area extending around the periphery of the display area. The display area generally corresponds to the area of the display **112**. Information is not displayed in the non-display area by the display, which non-display area is utilized to accommodate, for example, electronic traces or electrical connections, adhesives or other sealants, and/or protective coatings around the edges of the display area. The non-display area may be referred to as an inactive area and is not part of the physical housing or frame of the electronic device. Typically, no pixels of the display are in the non-display area, thus no image can be displayed by the display **112** in the non-display area. Optionally, a secondary display, not part of the primary display **112**, may be disposed under the non-display area. Touch sensors may be disposed in the non-display area, which touch sensors may be extended from the touch sensors in the display area or distinct or separate touch sensors from the touch sensors in the display area. A touch, including a gesture, may be associated with the display area, the non-display area, or both areas. The touch sensors may extend across substantially the entire non-display area or may be disposed in only part of the non-display area.

A front view of an example electronic device **100** that is a portable electronic device is illustrated in FIG. **2**. A front view of an example electronic device **100** that is a tablet computer **301** is illustrated in FIG. **3**.

Selection options may include virtual or displayed elements. When a touch associated with a selection option is detected, the device **100** performs an action associated with the selection option. Examples of selection options include buttons, scrollbars, text input fields, checkboxes, and keys representing characters or functions on a virtual keyboard. Representations of selection options may be displayed on the display **112** of an electronic device **100**. Selection options may also include interactive areas that have no visual indication or representation, but may provide input that is detected by the device **100**.

A selection area is associated with a selection option. When a touch location is within the selection area for a selection option, the selection option is identified for processing in association with the touch location. When a selection option is displayed on the display **112**, the associated selection area may have a different size and shape than the displayed representation of the selection option or the same size and shape may be utilized.

Touch sensors **114** detect touch input, thus providing the device **100** with an interface to identify displayed selection options based on detected touch locations. The resolution of the touch sensors **114** in electronic devices **100** may be an imprecise indication of the actual location of the touch. The touch location has an associated amount of uncertainty, for example 1 to 9 mm based on the spacing of touch sensors **114** and other factors.

FIG. **4** shows a touch location **450** and a corresponding touch area **460**. A touch area **460** may compensate for inherent imprecision of determination of a touch location **450**.

The touch area **460** may be derived from touch data received from the touch sensors **114** for a detected touch. A touch area **460** may alternatively be a virtual area around the touch location **450**, such as the touch area **460**.

The size of the virtual touch area **460** may be based on known characteristics, e.g., uncertainties and inaccuracies, of the touch sensors **114**. For example, when the resolution for a touch location **450** is 6 mm, the device **100** may generate a 6 mm radius virtual touch area **460** around a touch location to compensate.

Although a circle is utilized for the touch area **460** in the examples herein, other shapes may be utilized. For example, a custom shape that more accurately represents the contact shape of a finger or stylus touching a touch-sensitive display may be utilized. Other input data may determine the shape or size of the touch area **460**. For example, the shape of the touch area **460** may be angled based on orientation information received from the accelerometer **136** because the orientation of the device **100** may affect the angle of contact with the touch-sensitive display **118**.

For example, in FIG. **4**, a touch location **450** is detected and an associated circular touch area **460** is generated. When the touch location **450** changes to another location, information may be provided as to the angle of the touch input. Adjusting for the angle may reduce uncertainty of touch location perpendicular to direction of change of location of the touch. The touch area may optionally be updated to reflect the direction of change.

In the example of FIG. **5**, a plurality of selection options **510**, **520**, **530** are displayed on the touch-sensitive display **118**. Photos **510**, **530** and their associated selection areas are relatively large compared to the selection area and display area of a nearby "Delete?" checkbox **520**. The device **100** detects a touch at a touch location **540** near the selection areas **510**, **520**, **530**, but not within any one selection area. In this example, the device **100** generates a virtual touch area **560** to disambiguate between three selection options **510**, **520**, **530**.

As described in greater detail below, an area of overlap between the touch area **560** and the selection areas of the selection options is determined. An overlap value is determined for one or more of the selection areas based on the areas of overlap and optionally the size of the associated selection area. The selection option having the largest overlap value is identified.

In this example, the area of overlap **515** between a first selection area **510** and the touch area **560** is greater than the area of overlap **525** between a selectable checkbox **520** and the touch area **560** and is also greater than the area of overlap **535** between a second selection area **530** and the touch area **560**.

The overlap value may be determined by dividing the area of overlap by the size of the selection option, resulting in the proportion of the selection area covered by the touch area **560**. The selection area that has the greatest proportion of area overlapping with the touch area **560** is identified as the selection option to input to the device **100**. In the example shown in FIG. **5**, although the area of overlap **515** with the first selection area **510** is larger than the area of overlap **525** with the area of the selectable checkbox **520**, a greater proportion of area **520** is covered by the touch area **560**, and the checkbox **520** is identified in this example. Thus, the device **100** need not select the first selection area **510** because the first selection area **510** has the largest area of overlap with the touch area **560**.

The overlap values may be utilized to rate the various selection options and provide for selection of a selection option by identifying the selection option having the highest overlap value. In one example, the device determines the overlap value by dividing the area of overlap by the size of the selection area. This determination may be based on additional factors, such as the distance of the touch location to selection options.

A flowchart illustrating a method of determining overlap values is shown in FIG. **6**. The method may be carried out by software executed, for example, by the processor **102**. Coding of software for carrying out such a method is within the scope of a person of ordinary skill in the art given the present description. The method may contain additional or fewer processes than shown and/or described, and may be performed in a different order. Computer-readable code executable by at least one processor of the portable electronic device to perform the method may be stored in a computer-readable medium, which may be a non-transitory or tangible storage medium.

When a touch is detected **610** by the touch-sensitive display **118**, touch data, including a touch location, is provided to the processor **102**. For example, the touch location may be an x, y coordinate and may include additional touch information such as a time stamp. A touch area is determined **620** based on the received touch location. The touch area may be determined based on the raw touch input data or by establishing a virtual touch area based at least on the touch location. The area of overlap between the touch area and the selection area of a selection option is determined **630**. The selection area may be the same as or differ from the display area of a selection option.

An overlap value is determined **640** based on the area of overlap and the size of the selection area in this example. This determination may be a division operation of the selection area by the area of overlap. A selection option is selected **650** based on the determined overlap value. This determination may involve comparing the overlap value with overlap values of the other selection options and selecting the overlap value with the largest value. For example, a threshold value for the overlap value may be applied before the corresponding selection option is selected.

Different selection options may be displayed in different virtual layers, which may be referred to as z-orders, and selection options on one layer may overlap or be obscured by selection options in another layer. The obscured areas may be addressed when determining the overlap value. "Obscuring" or "overlapping" of displayed objects refers to virtual obscuring or virtual overlapping herein. A skilled person will understand that the device does not display an obscured area of a selection option.

Two selection options **710**, **720** are shown displayed on the touch-sensitive display **118** of the electronic device **100** in FIG. **7**. The selection options are shown as photos in a scrapbook application that may be moved around and arranged on the display. In this example, one photo **710** is moved to a position that partially obscures the other photo **720**. A user touches the visible region of photo **710** in an attempt to select the upper photo **710**. In this example, a virtual touch area **740** is generated for the detected touch location **730** and overlaps with both displayed photos **710**, **720**.

In this example, when determining an area of overlap with a touch area, the visible areas, not obscured areas, of a selection option are utilized. Any obscured area of a selection option may be excluded when determining of an area of overlap. Selection options may optionally be processed in order, e.g., starting at the top-most or unobscured selection option and proceeding to the bottom-most or lowermost selection option, and determining the areas of overlap between the touch area and each selection area, while excluding regions of a selection option obscured by other selection options.

In another example, areas of overlap with the touch area for selection options on higher layers may be subtracted from an area of overlap with the touch area for a selection option on a lower layer. Any previously determined and optionally stored areas of overlap from higher layers that overlap an area of overlap for a lower layer are subtracted from the determined area of overlap for the lower layer. The resultant area of overlap may be utilized to determine an overlap value by dividing the resultant area of overlap by the selection area.

FIG. **8** illustrates another example of obscured selection options. In this example, selection option **810** is on top, **820** in the middle layer, and **830** is on the bottom. Selection option **810** partially obscures both selection options **820** and **830**, while selection option **820** partially obscures selection option **830**. When determining overlap values for each selection option, for example as described with reference to FIG. **7**, an area of overlap for selection option **810** may be determined first. An area of overlap with the touch area for selection option **820** is determined and may include subtracting or excluding any area obscured by selection option **810**. An area of overlap with the touch area for section option **830** is determined and may include subtracting any area obscured by selection option **810** and selection option **820**. Thus, obscured areas that overlap with the touch area are not considered when determining overlap area with the touch area for a selection option.

In FIG. **9**, selection options **910**, **920**, **930** are displayed in close proximity to one another. When a touch location **950** is detected, the touch area **960** overlaps and entirely covers two of these selection options in this example. When the two selection options **910**, **920** are the same size, and the area of overlap is the same, the same overlap value results for both selection options. Mathematical weightings based on factors other than area of overlap and the selection area may be utilized to determine overlap values.

One example of weighting involves considering the touch location, such that when the touch location is associated with a selection option, the overlap value associated with that selection option is increased. In the example of FIG. **9**, the touch location **950** is within the area of the upper selection option **910**, and the overlap value for that selection option may be increased, giving this selection option **910** a higher overlap value than the lower selection option **920**. For example, accurate results may be achieved by multiplying the overlap value of the selection option that contains the touch location **450** by a factor of 2.

Other forms of weighting may be utilized. For example, weightings may be assigned based on the distance of the touch location from the centres of the selection options when input is targeted at the centres, rather than edges or corners of selection options. The smaller the distance, the larger the weighting may be.

Weighting may also be applied to selection options that are more likely to be selected based on context. For example, some buttons or keys may be selected more often than others and may be weighted as more commonly selected buttons. Selection options may be determined to be more commonly selected on a user-by-user basis or by data from all users. One or more selection options may be more likely to be selected as a result of previous actions, for example "EXIT" may be more likely to be selected after a save action is performed, and the "EXIT" selection option may have a higher weighting than other selection options.

A flowchart illustrating a method of determining overlap values with weighting is shown in FIG. **10**. The method may be carried out by software executed, for example, by the processor **102**. Coding of software for carrying out such a method is within the scope of a person of ordinary skill in the art given the present description. The method may contain additional or fewer processes than shown and/or described, and may be performed in a different order. Computer-readable code executable by at least one processor of the portable electronic device to perform the method may be stored in a computer-readable medium, which may be a non-transitory or tangible storage medium.

When a touch is detected **1005** by the touch-sensitive display **118** touch data, including a touch location, is provided to the processor **102**. For example, the touch location may be an x, y coordinate and may include additional touch information such as a time stamp. A virtual touch area is established **1010** based on the touch location, for example, by generating a circle of a fixed radius centred on the touch location. The radius may be, for example, 3 mm to 15 mm, 4 mm to 6 mm, 8 mm to 10 mm, or any suitable size or range. A list of selection areas may be accessed and a selection area from the list is identified **1015** to process. For example, each subsequent identification of a selection area at **1015** may be a selection area higher or lower based on ordering or layering of displayed selection options, e.g., in a virtual z-direction. The area of overlap between the touch area and the selection area is determined **1020**. When a primary target is identified **1030** or the touch location is not within the selection area at **1035**, the process continues at **1050**. The weighting is applied **1040** by modifying the area of overlap, for example, by applying a factor to the area of overlap, such as multiplying by 2. The weighting may be applied in other ways, such as adding a factor to the overlap value. The area of overlap is optionally modified **1050** when obscured areas are present. For example, a list of previously determined areas of overlap for selection areas may be stored, and one or more obscured areas may be excluded or subtracted from the area of overlap with the touch area. The updated area of overlap may be added to the list of previously determined areas of overlap. The overlap value is determined by dividing the overlap area by the selection area **1060**. The overlap value may be added to a stored list of overlap values. When any additional selection areas are unprocessed **1070**, the process continues at **1015**. The selection option with the highest overlap value is identified **1080**, for example, when all the selection areas with obscured areas are processed.

The implementation described in FIG. **10** is an illustrative example of one of many possible implementations envisioned by this disclosure. Other implementations may choose a different ordering, different weightings, and different combinations. Modifications to the examples may be made utilizing techniques to improve the efficiency and reduce computation or provide other advantages.

The present disclosure may be embodied in other specific forms without departing from its spirit or essential characteristics. The described examples are to be considered in all respects only as illustrative and not restrictive. The scope of the disclosure is, therefore, indicated by the appended claims rather than by the foregoing description. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. A method comprising:

displaying a plurality of selection options on a touch-sensitive display;

detecting a touch at a touch location on the touch-sensitive display;

determining a touch area based on the touch location;

determining an overlap area based on the touch area that overlaps a selection area associated with a selection

option, wherein a first selection area partially obscures a second selection area, further comprising excluding the obscured area of the second selection area when determining the overlap area for the second selection area, wherein said excluding comprises subtracting a portion of the touch area that overlaps the first selection area from a portion of the touch area that overlaps the second area when determining the overlap area of the second selection area;

determining whether the touch location is within the selection area associated with the selection option;

in response to the touch location within the selection area:

assigning a weighting factor associated with the touch location within the selection area; and

determining an overlap value based on a size of the overlap area, a size of the selection area, and the weighting factor;

in response to the touch location outside the selection area, determining the overlap value based on a size of the overlap area and a size of the selection area; and

identifying a selection option based on the determined overlap value.

2. The method according to claim **1**, wherein the overlap value is determined for each selection area that at least partially overlaps the touch area.

3. The method according to claim **1**, wherein the overlap value is determined for each selection area associated with one of the plurality of selection options.

4. The method according to claim **1**, wherein the identified selection option has a largest overlap value.

5. The method according to claim **1**, wherein the selection areas for the plurality of selection options have different sizes.

6. The method according to claim **1**, wherein the touch area is a virtual touch area.

7. The method according to claim **6**, wherein the virtual touch area is centered on the touch location.

8. The method according to claim **6**, wherein a shape of the virtual touch area is determined by a contact shape of a finger or stylus touching the touch-sensitive display.

9. A non-transitory computer-readable storage medium having computer-readable code executable by at least one processor of a portable electronic device to perform the method of claim **1**.

10. An electronic device comprising:

a touch-sensitive display to receive a touch; and

at least one processor coupled to the touch-sensitive display and configured to:

display a plurality of selection options on a touch-sensitive display;

detect a touch at a touch location on the touch-sensitive display;

determine a touch area based on the touch location;

determine an overlap area based on the touch area that overlaps a selection area associated with a selection option, wherein a first selection area partially obscures a second selection area, the processor is further configured to exclude the obscured area of the second selection area when determining the overlap area for the second selection area, wherein said excluding comprises subtracting a portion of the touch area that overlaps the first selection area from a portion of the touch area that overlaps the second area when determining the overlap area of the second selection area;

determine whether the touch location is within the selection area associated with the selection option;

in response to the touch location within the selection area:

assign a weighting factor associated with the touch location within the selection area; and

determine an overlap value based on a size of the overlap area, a size of the selection area, and the weighting factor;

in response to the touch location outside the selection area, determine the overlap value based on a size of the overlap area and a size of the selection area; and

identify a selection option based on the determined overlap value.

11. The electronic device according to claim **10**, wherein the at least one processor is configured to determine the overlap value for each selection area that at least partially overlaps the touch area.

12. The electronic device according to claim **10**, wherein the at least one processor is configured to determine the overlap value for each selection area associated with one of the plurality of selection options.

13. The electronic device according to claim **10**, wherein the at least one processor is configured to identify the selection option having a largest overlap value.

14. The electronic device according to claim **10**, wherein the at least one processor is configured to display selection options having at least two different sizes.

15. The electronic device according to claim **10**, wherein the touch area is a virtual touch area.

16. The electronic device according to claim **15**, wherein the virtual touch area is centered on the touch location.

17. The electronic device according to claim **15**, wherein a shape of the virtual touch area is determined by a contact shape of a finger or stylus touching the touch-sensitive display.

18. The method according to claim **1**, wherein the displayed selection options are processed in order, starting at the first selection option, to determine the overlap value for each selection option.

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